

## CLAIMS

1           1.       A modular shade system with solar tracking panels for use on a support surface  
2 comprising:  
3           a series of generally North-South oriented, spaced apart torque tubes, each torque tube having an  
4 axis;  
5           panels mounted to at least some of the torque tubes to create spaced-apart rows of panels along  
6 said torque tubes, at least some of the panels being solar collector panels;  
7           a shade structure positioned at a selected location between selected ones of the torque tubes and  
8 above the support surface so to provide an enhanced shaded region thereunder;  
9           a support structure comprising:  
10           a first mounting assembly mounting each torque tube above the support surface for  
11 rotation about the axis of each said torque tube; and  
12           a second mounting assembly supporting the shade structure at the selected location; and  
13           a tilting assembly selectively rotating each torque tube about its axis.

1           2.       The system according to claim 1 wherein the first mounting assembly comprises:  
2 pivot connectors;  
3           Southside supports pivotally connected to the torque tubes by the pivot connectors; and  
4           Northside supports pivotally connected to the torque tubes by the pivot connectors.

1           3.       The system according to claim 1 wherein the Southside and Northside supports comprise  
2 vertical posts.

1           4.       The system according to claim 1 wherein the second mounting assembly comprises  
2 vertically extending posts supporting East-West extending shade support bars.

1           5.       The system according to claim 1 wherein the tilting assembly comprises a drive element  
2 associated with each torque tube, a drive element coupler operably coupling each drive element, and a  
3 driver drivingly coupled to at least one drive element or drive element coupler so to simultaneously

4 rotate the torque tubes about their associated axes and simultaneously tilt the panels mounted to the  
5 torque tubes.

1 6. The system according to claim 1 wherein the solar collector panels comprise a light  
2 concentrator type of solar collector panel.

1 7. The system according to claim 1 wherein the solar collector panels comprise a light  
2 concentrator type of photovoltaic (PV) panel.

1 8. The system according to claim 1 wherein the panels are modular panels.

1 9. The system according to claim 8 wherein the modular panels comprise light-transmissive  
2 panels.

1 10. The system according to claim 9 wherein the light-transmissive panels are placed  
2 adjacent to one another.

1 11. The shading system according to claim 8 wherein the modular panels comprise PV panels  
2 and light-transmissive panels.

1 12. The system according to claim 8 wherein the modular panels comprise PV panels.

1 13. The system according to claim 12 further comprising protective panels mounted opposite  
2 the lower surfaces of the PV modules.

1 14. The system according to claim 13 wherein the protective panels comprise at least one of  
2 wire mesh, sheet metal, perforated sheet metal, plastic, perforated plastic, cement board, perforated  
3 cement board, and phosphorescent material.

1 15. The system according to claim 13 wherein the PV modules and the protective panels are  
2 constructed to permit some light to pass therethrough.

1           16.     The system according to claim 13 wherein the protective panels have a convex lower  
2 surface.

1           17.     The system according to claim 13 wherein the protective panels are perforated.

1           18.     The system according to claim 8 wherein the modular panels comprise phosphorescent  
2 modular panels to provide passive nighttime illumination beneath support structure.

1           19.     The system according to claim 8 wherein the modular panels comprise illuminated  
2 panels.

1           20.     The system according to claim 8 wherein the modular panels comprise space cooling  
2 elements comprising at least one of spray misters for evaporative cooling, fans, pumps, wetted canvas,  
3 water storage containers, tubing, and evaporative spouts.

1           21.     The system according to claim 1 further including modular features for multi-  
2 functionality and customization.

1           22.     The system according to claim 21 wherein said modular features include elements for  
2 space cooling comprising at least one of spray, fans, pumps, wetted canvas, water storage containers,  
3 tubing, and evaporative spouts.

1           23.     The system according to claim 21 wherein said modular features include elements for  
2 water collection and drainage.

1           24.     The system according to claim 21 wherein said modular features comprise acoustical  
2 control panels.

1           25.     The system according to claim 21 wherein said modular features comprise at least one of  
2 seating elements, planting elements, playground elements, restroom elements, signage elements,  
3 antennae modules, payment machines, and stage elements.

1           26.    The system according to claim 21 wherein said modular features comprise a rail  
2 transportation element.

1           27.    The system according to claim 21 wherein said modular features comprise a fuel cell  
2 charging system.

1           28.    The system according to claim 21 wherein said modular features comprise a hydrogen  
2 production device.

1           29.    The system according to claim 21 wherein said modular features comprise a hydrogen  
2 storage device.

1           30.    The system according to claim 21 wherein said modular features comprise inverters for  
2 converting dc to ac electricity.

1           31.    The system according to claim 21 wherein said modular features comprise electrical  
2 wireways.

1           32.    The system according to claim 21 wherein said modular features comprise elements  
2 which facilitate roller skating, ice skating, car shows, horse riding, housing the homeless, farmers  
3 markets, soccer matches, tennis matches, concerts, lightshows, fitness, transportation nodes.

1           33.    A modular shade system with solar tracking panels comprising:  
2 a support surface;  
3 a series of generally North-South oriented, spaced apart torque tubes, each torque tube having an  
4 axis;  
5 panels mounted to at least some of the torque tubes to create spaced-apart rows of panels along  
6 said torque tubes, at least some of the panels being solar collector panels;  
7 a shade structure positioned at a selected location between selected ones of the torque tubes and  
8 above the support surface so to provide an enhanced shaded region thereunder;  
9 a support structure comprising:

10 a first mounting assembly mounting each torque tube above the support surface for  
11 rotation about the axis of each said torque tube; and  
12 a second mounting assembly supporting the shade structure at the selected location; and  
13 a tilting assembly selectively rotating each torque tube about its axis.

1 34. The system according to claim 33 wherein the support surface comprises the ground.

1 35. The system according to claim 33 wherein the support surface comprises a roof.

1 36. The system according to claim 33 wherein the support surface comprises a vehicular  
2 parking area having parking stalls at the enhanced shaded region and the traffic regions adjacent to the  
3 parking stalls.